WHAT IS CLAIMED IS:

1. A gradient copolymer comprising at least two monomers,

a) the first (M_1), the homopolymer of which corresponding to a Tg_1 of less than 20°C, representing at least 50% by weight of the total weight of the copolymer,

b) the second (M_2), the homopolymer of which corresponding to a Tg_2 of greater than 20°C, representing at most 50% by weight of the total weight of the copolymer,

at least one of the monomers being hydrophilic and representing at least 5% by weight of the total weight of the copolymer,

said copolymer comprising at least one monomer M_i such that the probability of encountering M_i in any standardized position x situated on the polymer chain is nonzero.

2. The copolymer as claimed in claim 1, wherein Tg_1 is between -150 and 20°C.

3. The copolymer as claimed in claim 1, having an average masses of between 5000 g/mol and 1 000 000 g/mol and exhibiting a polydispersity index of between 1.1 and 2.5.

4. The copolymer as claimed in claim 1, wherein the hydrophilic monomer represents at least 10% by weight of the total weight of the copolymer.

5. The copolymer as claimed in claim 1, wherein the hydrophilic monomer is selected from the group consisting of:

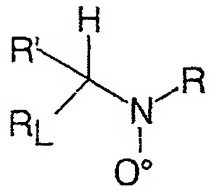
- ethylenic carboxylic acids, acrylic acid, methacrylic acid, itaconic acid, fumaric acid;
- acrylates and methacrylates of polyethylene glycol or of glycol which are or are not substituted on their end functional group by alkyl, phosphate, phosphonate or sulfonate groups;
- amides of unsaturated carboxylic acids, acrylamide, methacrylamide and their N-substituted derivatives;

- aminoalkyl acrylates, methacrylates, aminoalkylmethacrylamides;;
- carboxylic anhydrides carrying a vinyl bond, maleic anhydride, fumaric anhydride;
- vinylamides, vinylpyrrolidone, vinylacetamide;
- vinylamines, such as vinylmorpholine, vinylamine; and
- vinylpyridine.

6. The copolymer as claimed in claim 1, wherein the monomer M_1 is selected from the group of monomers consisting of:
- linear or branched C_1-C_{12} alkyl acrylates,
- polyethylene glycol acrylate polyethylene glycol (meth)acrylate,
- dienes, butadiene and isoprene.

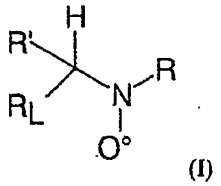
7. A process for producing a gradient copolymer comprising polymerizing by solution or bulk controlled radical polymerization, at a temperature of between 10 and 160°C, in the presence of a radical polymerization initiator and of an agent for controlling the polymerization, a mixture of monomers comprising at least two monomers, the first (M_1), the homopolymer of which corresponding to a Tg_1 of less than 20°C, representing at least 50% by weight of the total weight of the mixture, the second (M_2), the homopolymer of which corresponding to a Tg_2 of greater than 20°C, representing at most 50% by weight of the total weight of the mixture, at least one of the monomers having to be hydrophilic and represent at least 5% by weight of the total weight of the mixture.

8. The process as claimed in claim 7, wherein the agent for controlling the polymerization is a nitroxide of general formula:

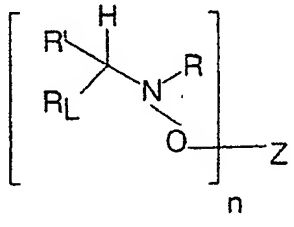


- where R' and R, which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; preferably, R and R' are tert-butyl groups;
- and where R_L is a monovalent group with a molar mass of greater than 16 g/mol which can be a phosphorus group or an aromatic group.

9. The process as claimed in claim 7, wherein the polymerization initiator and the control agent are advantageously replaced by a mixture composed of alkoxyamine corresponding to the following general formula (II) and of nitroxide corresponding to the general formula (I):



(I)



(II)

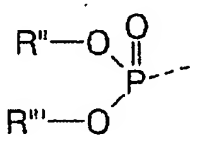
in which:

- n is an integer of less than or equal to 8 and preferably of between 1 and 3,
- Z is a carrying monovalent or polyvalent radical of styryl, acryloyl or methacryloyl type,
- where R' and R, which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; preferably, R and R' are tert-butyl groups;

- and where R_L is a monovalent group with a molar mass of greater than 16 g/mol which can be a phosphorus group or an aromatic group,

the nitroxide (I) representing from 0 to 20% by weight of the total weight of the mixture.

10. The process as claimed in claim 8, wherein, R_L is a phosphonate group of formula:



- where R'' and R''', which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; in particular, R'' and R''' are ethyl groups;

the nitroxide (I) representing from 0 to 20% by weight of the total weight of the mixture.

11. A process for the aqueous dissolution, of the gradient copolymer of claim 1 comprising:

1) dissolving the copolymer in a ketone solution, at a level of solid of between 20 and 90%,

2) neutralizing the solution obtained in 1, if necessary, by addition of a molar solution either of acid or of base, the acid or base choice being conditioned by the chemical nature of the hydrophilic monomer,

3) adding water, with vigorous stirring, to the solution obtained in 1 or optionally in 2 in a proportion such that the level of solid obtained is between 1 and 80%; optionally, the water can be replaced by water/alcohol mixtures in proportions ranging from 99/1 to 50/50;

4) evaporating the ketone until the desired level of solid is obtained.

12. (canceled)

13. The gradient copolymer of claim 1 comprising a paint, adhesive, glue or cosmetic formulation.

14. (canceled)

15. (canceled)

16. (canceled)

17. The copolymer of claim 1 wherein the second monomer (M_2), the homopolymer of which corresponding to a Tg_2 of greater than 50°C

18. The copolymer as claimed in claim 2, wherein Tg_1 is between -120 and 15°C.

19. The copolymer as claimed in claim 3, exhibiting a polydispersity index of between 1.1 and 2.

20. The process of claim 7 wherein said controlled radical polymerization, occurs at a temperature of between 25 and 130°C.